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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,195	03/25/2004	Michael P. Galligan	4339/4358I (CON)	9678

48226 7590 02/27/2008

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EXAMINER	
NGUYEN, NGOC YEN M	
ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
02/27/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/810,195	GALLIGAN ET AL.	
	Examiner	Art Unit	
	Ngoc-Yen M. Nguyen	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-11,20,21,36-39,49 and 50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-11, 20-21, 36-39, 49-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The disclosure is objected to because of the following informalities: on page 16, lines 4-26, as amended, it is disclosed that "A visual comparison of Figures 1A through 1D and Figures 2A through 2C illustrated a roughened surface that results from electric arc spraying an anchor layer onto a substrate as taught therein", however, it is unclear how the "*visual* comparison" can be made between the Figures 1A through 1D (first set of Figures) and Figures 2A through 2C (second set) because the first set is for a foam substrate while the second set is for flat metal substrate; the second set is of "a cross section" while the first set is not; the first and second sets are at different magnifications.

Appropriate correction is required.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7, 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are requested to point out support in the instant specification, by page and line numbers, for the limitation "ceramic substrate" in claims 7 and 11, which can be conformed "by bending and/or compressing the catalyst member". It is well known in the art that ceramic is normally hard, porous and brittle.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-11, 20-21, 36-39, 46-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 8-9, it is unclear if "an internal combustion engine" is the same as the internal combustion engine of claim 36 or of claim 8 (for claim 9).

In claim 36, it is unclear what is required to be or occurred "within an exhaust manifold or exhaust flow pipe". In this office action, claim 36 is read to require the catalyst member is "within an exhaust manifold or exhaust flow pipe".

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-5, 7-11, 21, 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gorynin et al (5,204,302) in view of in view of Rondeau (4,027,367), optionally further in view of Ishida (4,455,281).

Gorynin '302 invention relates to a multi-layered catalyst on a metal substrate for the catalytic conversion of gases, such as purification of exhaust gases of internal combustion engines (note column 1, lines 6-10).

Gorynin '302 discloses a catalyst comprising a metallic substrate; an adhesive sublayer diffusion bonded onto said substrate; and a catalytically active layer deposited on said sublayer and a porous layer deposited on said catalytically active layer (note claim 1). The adhesive sublayer is prepared from thermally reactive powders, such as those prepared from nickel and titanium, aluminum with at least one or more of Co, Cr, Mo, Ta, Nb, Ti or Ni or silicon with at least one or more of Ti, Nb, Cr, W, Co, Mo, Ni or Ta (note column 2, lines 25-35). For the composition of the Ni alloy used, it would have been obvious to one of ordinary skill in the art to optimize such composition to obtain the best adhesive layer.

The adhesive layer in Gorynin is formed by plasma spraying. The thermally reactive powders are introduced into a plasma torch and an exothermic reaction is initiated in the torch. The exothermic powders impinge the substrate where the reaction continues. The heat generated in the reaction causes diffusion of the sub-layer into the substrate resulting in a diffusion bond and strong adhesion of the sublayer to the substrate (note column 3, lines 6-15). Thus, Gorynin '302 fairly teaches that the plasma

spraying process is used to obtain a diffusion layer which improves the bonding between the two layers.

The difference is Gorynin '302 does not disclose the use of electric arc to form the adhesive layer.

Rondeau '367 discloses a method of thermal spraying a substrate to deposit a self-bonding coating on such substrate, comprising supplying an electric arc thermal spray gun with a wire feed comprising an alloy of nickel and aluminum or titanium, and using such electric arc thermal spray gun, spraying said wire feed onto such substrate to coat the same thereby to establish diffusion bond between such coating and such substrate to provide a self-bonding coating on such substrate (note claim 1). Rondeau '367 discloses that several types of thermal spraying guns are available including combustion flame spray guns, e.g., the oxy-fuel gas type, plasma arc spray guns and electric arc spray guns. Combustion flame spray guns require a source of fuel, such as acetylene, and oxygen and the temperature produced therein are usually relatively low and often incapable of spraying materials having melting points exceeding 5,000^{o}F. Plasma arc spray guns are usually the most expensive type and they produce much higher temperatures than the combustion type, e.g. up to approximately 30,000^{o}F. Furthermore, plasma arc spray gun require a source of inert gas, such as argon, for creation of the plasma, and the gas flow rate and electric power therefor require extremely accurate control for proper operation. On the other hand an electric arc spray gun simply requires a source of electric power and a supply of compressed air or other

gas, as is well known, to atomize and to propel the melted material in the arc to the substrate or target (note column 1, lines 25-43).

In undertaking the method of Rondeau '367 a number of important advantages are realized over the prior art. Firstly, the process uses an electric arc spray gun, which is more economically operated than other thermal spray equipment. Second, the material to be sprayed is supplied as a wire, which is more convenient to use than powder. The wire may be thin strand all the way up to a relatively thick rod as long as it is suitable for spraying through an electric arc spray gun. Third, the wire is readily formed as an alloy of the two primary materials nickel and aluminum or nickel and titanium. Fourth, the cohesive, adhesive and hardness attributes of the coating on an article formed by the method of the invention are generally equivalent to or better than corresponding attributes for a coating on an article sprayed with powder using other thermal spray devices (note paragraph bridging columns 2-3).

Rondeau '367 can be further applied to teach that the wire alloy comprises a minimum of 93% nickel, from 4 to 5.2% aluminum, from 0.25 to 1.00% Ti (note column 4, lines 15-20).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use electric arc spraying method, instead of plasma spraying, to form the adhesive layer in Gorynin '302, as suggested by Rondeau '367 because electric arc spraying method can form the same diffusion bond between the two layers but it would cost less plus the additional advantages as stated above.

Optionally, Ishida '281 can be applied as stated above to teach that it is known in the art to form an adhesive layer on a substrate of a catalyst by using electric arc spraying process before depositing the catalytic layer in order to form a catalyst that is highly resistant to peel off (i.e. better bonding) (note column 7, lines 62-67).

Claims 2-11, 20-21, 36-39, 46-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gorynin '302 in view of Rondeau '367 and Ernest et al (4,451,441), optionally further in view of Ishida '281 and JP 08-319,824 (EP 081 211 can be used as an unofficial English translation).

Gorynin '302, Rondeau '367 are applied as stated above.

Ishida '281 can be optionally applied as stated above.

The difference not yet discussed is Gorynin '302 does not disclose a substrate with at least two regions of different substrate densities.

Ernest '441 discloses a method for removing carbon and lead particles from internal combustion engine exhaust gases by passing the gases through a coarse filter and then through a fine filter (note column 1, lines 29-45). The filters may comprise any material which is effective for trapping the particles in the gases (note column 1, lines 62-66). Preferably, the filters are unitary structures of relatively large size such as ceramic monoliths, metal wools or metal meshes (note column 2, lines 10-21). Ernest '441 further discloses that a catalyst material may be deposited on the filters and when used in the treatment of internal combustion engine exhaust gases, the catalyst material is preferably also effective for the conversion of hydrocarbons, carbon monoxide and/or

nitrogen oxide pollutants. Such catalyst materials include a noble metal, an element of the first transition series, and mixtures thereof. The noble metals are gold, silver and the platinum group metals (note column 3, lines 37 and 56-66) with platinum group metal being preferred (note paragraph bridging columns 3-4). For the amount of catalytic material on the filters, Ernest '441 fairly teaches, in the examples, that the loading of platinum and palladium in the coarse filter is different than that in the fine filter (note Table II). Table II also teaches that the same catalytic material is used for both filters.

Ernest '441 can further be applied to teach that filters, i.e. substrates, can be ceramic monoliths, metal wools or metal meshes. An open cell filter structure having a plurality of interconnected voids is especially preferred (note column 2, lines 15), thus, Ernest '441 fairly teaches that foam structure is desirable. Also, Ernest '441 teaches that if a substrate area higher than that of the filter is desired, the catalyst material may be supported on a porous, refractory inorganic oxide. These oxides have a high total pore volume and surface area (note column 4, lines 31-41).

Ernest '441 further teaches that the coarse filter is located upstream in the flow of the gases through the composition and the fine filter is located downstream from the coarse filter in the flow of gases through the composition. The fine filter has a greater number of cells per unit length and a smaller cell size than the coarse filter. The respective pore sizes and permeabilities may vary in accordance with the particular nature of the gas under treatment (note column 3, lines 8-11). This fairly suggests to one of ordinary skill in the art as to how to decide where to position the catalyst

composition based on the number of cells per unit length and the nature of the gas under treatment and the "coarse" filter (upstream catalyst) cannot be used interchangeably with the “fine” filter (downstream catalyst).

Optionally JP ‘824 can be applied to teach that exhaust purifying apparatus for internal combustion engine conventionally contains a front-stage (upstream) exhaust purifier and a rear-stage (downstream) exhaust purifier (note Figure 2 and paragraph [0020] in JP '824 or EP '211, column 4, lines 41-55). The upstream exhaust purifier is designed differently than the downstream exhaust purifier (note Figures 3 and 5, paragraphs [0021] and [0023] in JP ‘824 or EP 211, paragraph bridging columns 4-5 and paragraph bridging columns 5-6). This fairly suggests to one skilled in the art to select a proper catalyst based upon the location of such catalyst in the exhaust purifying apparatus.

It would have obvious to one of ordinary skill in the art at the time the invention was made to use substrates with different densities and different catalytic loadings in the process of Gorynin ‘302, as suggested by Ernest ‘441 because the use of different densities would promote the removal of carbon and lead particles from internal combustion engine exhaust gases.

Claims 2, 6-11, 20-21, 36-39, 46-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ernest ‘441 in view of Ishida ‘281, optionally further in view of JP ‘824.

Ernest '441 is applied as stated above to teach a method for treating exhaust gas from an internal combustion engine (note claim 1). When used in the treatment of internal combustion engine exhaust gases, the catalyst material is preferably also effective for the conversion of hydrocarbons, carbon monoxide and/or nitrogen oxide pollutants (note column 3, lines 56-59).

Ernest '441 discloses that during use, the catalyst composition is typically disposed so that it occupies the major part of the cross-sectional area of a housing having a gas inlet and a gas outlet. The composition typically has the general shape of the housing and is positioned in the housing with the general direction of gas flow between the inlet and outlet. The filters may be adhered together or spaced apart (note column 5, lines 42-50). Thus, Ernest '441 fairly teaches that the filters, which are served as carriers for the catalyst material, are "shaped" in order to have the "general shape" of the housing.

Optionally, JP '824 is applied as stated above.

The difference is Ernest '441 does not disclose an anchor layer.

Ishida '281 discloses a process for producing a catalyst unit for NO_x reduction of exhaust gas, wherein molten metal is sprayed upon surfaces of a metal plate allowing the molten metal to accumulate thereon to form rough surfaces and rough surfaces thus obtained are deposited with a catalytic substance for NO_x reduction of exhaust gas. Forming the surfaces of the metal plate into rough surfaces is effected by molten metal spraying. In typical case, a metal wire is heated to be molten by contact resistance of electricity, an electric arc or high temperature flames, and molten metal thus obtained

are sprayed together with gas such as compressed air through nozzles on the surfaces of the metal plate (note paragraph bridging columns 4-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include an anchor layer deposited by electric arc method, as suggested by Ishida ‘281, in the catalyst used in Ernest ‘441 because such anchor layer would prevent the catalytic substance from falling off, i.e. the anchor layer would promote bonding between the substrate and the catalytic substance.

Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ernest ‘441 and Ishida ‘281, optionally further in view of JP ‘824 as applied to claims 2, 6-11, 36-39, 46-50 above, and further in view of Donomoto et al (4,798,770) or Draghi et al (6,042,879).

The difference not yet discussed is Ishida ‘281 does not disclose that the anchor layer comprises nickel and aluminum.

However, Ishida ‘281 teaches that the molten metal sprayed is preferred to be the same type of material as the metal plate (note column 5, lines 9-10) and the metal plate is desired to be heat resistant and corrosion resistant (note column 4, lines 53-64) such as stainless steel. It should be noted that the teaching of Ishida '281 should not be limited to just the exemplified metals.

Donomoto ‘770 discloses that alloys include Ni-Cr alloys, Ni-Al alloys containing 3-20% Al, Ni-Cr-Al alloys, Ni-Cr-Al-Y alloys are heat and corrosion resistant (note column 5, lines 51-63).

Alternatively, Draghi ‘879 teaches that MCrAlY, where M is nickel and/or cobalt, has corrosion and heat resistant properties (note column 4, lines 7-14). It would have been obvious to one skilled in the art to optimize the composition of the MCrAlY alloy to obtain the desired corrosion and heat resistant properties.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use any known metal alloy which has heat and corrosion resistant properties, such as the MCrAlY alloys as suggested by Donomoto '770 or Draghi '879 for the metal carrier in Ishida '281 because such properties are desirable for the metal carrier.

Applicant's arguments and Declaration filed November 26, 2007 have been fully considered but they are not persuasive.

Applicants argue that none of the cited references teach conforming the shape of the catalyst member by bending and/or compressing the catalyst member within an exhaust manifold or exhaust flow pipe.

In Gorynin ‘302, as disclosed in the Example, the catalyst was assembled by "corrugating a catalyst strip and rolling it into a cylinder", the steps of "corrugating" and "rolling" are considered the same as the claimed “bending”. It should be noted that Applicants' claim 36 requires the step of "changing the shape of the catalyst member by conforming the shape of the catalyst ...within an exhaust manifold or exhaust flow pipe", however, the exhaust manifold or exhaust flow pipe is not required to have a curve or a bend.

The Declaration by Mr. Galligan filed November 26, 2007 has been fully considered but it was not persuasive.

In Exhibit A, first,(items 6-9 in the Declaration) conformable catalyst members as claimed in Applicants' claims were tested and compared to rigid tubes for catalytic activity when inserted in the exhaust pipe of a 4-stroke motorcycle engine.

For this test, it is stated that the "catalyst technology used is Engelhard's MC20B technology", however, it is unclear if both the tested "conformable catalyst members" and "rigid tubes" have the anchor layer as required in Applicants' claim 36. Furthermore, Applicants' argument and the Declaration are fully considered but they are not persuasive because the claimed invention was not compared to the closest prior art, which is Gorynin '302 or Ernest '441. Section 716.02(b) of the MPEP states that "evidence of unexpected properties may be in the form of a direct or indirect comparison of the claimed invention with the closest prior art which is commensurate in scope with the claims. See In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and MPEP §716.02(d) - § 716.02(e). See In re Blondel, 499 F.2d 1311, 1317, 182 USPQ 294, 298 (CCPA 1974) and In re Fouche, 439 F.2d 1237, 1241-42, 169 USPQ 429, 433 (CCPA 1971) for examples of cases where indirect comparative testing was found sufficient to rebut a prima facie case of obviousness. In this case, Gorynin '302 fairly teaches a catalyst that can be shaped or bent, i.e. "corrugating" and "rolling" into a cylinder and Ernest '441 teaches that the catalyst composition (which comprises the filters as carriers and the catalyst material) typically has the general shape of the housing.

For the comparative test discussed in item 10 of the Declaration, Ernest '441 and JP '824 both show that the upstream catalyst cannot be used interchangeably with the downstream catalyst; therefore, any increase or decrease in HC or CO conversion is not unexpected when the upstream catalyst is used as a downstream catalyst or vice versa.

For item 13 in the Declaration, Ishida '281 is not relied upon to teach or suggest the step of changing the shape of the catalyst, Gorynin '302 or Ernest '411 is applied to teach this limitation. Again, in Applicants' claims, the engine exhaust pipe is not required to have a "bent" or "curve".

For item 14 in the Declaration, Applicants argue that Ishida teaches that it is undesirable to bend or deform the catalyst member. Granted that Ishida does not desire to deform the catalyst during the process of using the catalyst, however, the metal plate, which is used as the carrier for the catalyst, can be subjected to "bending work" (note column 3, lines 61-64) during the process of forming the catalyst itself.

For items 12, 15-16 in the Declaration, they are not persuasive for the reasons stated herein.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/

Primary Examiner, Art Unit 1793

February 28, 2008